

**Specification**  
for the  
**Automatic Identification System**  
(AIS)  
**Transponder**

**in Support of AIS Evaluation  
in New Orleans, LA**

**21 January 1998**

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## 1.0 SCOPE

The Coast Guard will lease up to 50 Digital Selective Calling/Automatic Identification System (DSC/AIS) transponders to place onboard vessels to perform demonstrations in New Orleans, LA. The transponders will be demonstrated as part of the Coast Guard's Vessel Traffic Service (VTS) Baseline System installation in New Orleans, LA. Installation and de-installation of the transponders shall be the responsibility of the vessel owner.

The Coast Guard will upgrade the VHF communications along the Lower Mississippi River in the New Orleans, LA area to DSC and install a limited DSC/AIS VTS Baseline system at Gretna Light for Baseline System Tests. This system will evaluate the DSC/AIS transponder ability to provide unobtrusive position and tracking information and other capabilities necessary for a VTS DSC/AIS based system. After successful demonstrations at Gretna Light, the system will be transitioned to a Vessel Traffic Center (VTC) in New Orleans where a full-scale VTS system will be tested and implemented.

**1.1. General.** This specification contains the requirements for DSC/AIS transponders. The transponders shall transmit vessel identification data from ships on which they are installed.

**1.2. Configurations.** The Coast Guard requires transponders in three configurations:

**1.2.1 Type 1 Configuration [CLIN 0001]**. Type 1 configured transponders shall be carry-on units each consisting of three functional elements: (a) a GPS/DGPS based vessel position subsystem, (b) a VHF/DSC radio communications subsystem, and (c) a display subsystem. Carry-on transponders shall be in hard-shelled containers that weigh not more than 20 pounds, inclusive of all three physical components, and shall operate in a commercial marine environment

**1.2.2 Type 2 Configuration [CLIN 0002]**. Type 2 configured transponders shall be permanently fixed installation units each consisting of three functional elements: (a) a GPS/DGPS based vessel position subsystem, (b) a VHF/DSC radio communications subsystem, and (c) a display subsystem.

**1.2.3 Type 3 Configuration [CLIN 0003]**. Type 3 configured transponders shall be permanently fixed installation units each consisting of two functional elements: (a) a GPS/DGPS based vessel position subsystem and (b) a VHF/DSC radio communications subsystem.

## 2.0 APPLICABLE DOCUMENTS

Document 8/1015-E Draft Revision of Recommendation ITU- R M.825-1	Characteristics of a Transponder System Using Digital Selective Calling (DSC) Techniques for Use with Vessel Traffic Services and Ship-to-Ship Identification <a href="http://www.itu.ch/">http://www.itu.ch/</a>	3 July 1997
Document 8/1012-E Draft Revision of Recommendation ITU- R M.1084-1	Interim Solutions for Improved Efficiency in the Use of the Band 156-174 by Stations in the Maritime Mobile Service <a href="http://www.itu.ch/">http://www.itu.ch/</a>	2 July 1997
47CFR Part 80	Title 47 Code of Federal Regulations Radio Frequency Devices; Part 80 Stations in the Maritime Services <a href="http://frwebgate3.access.gpo.gov/cgi-bin/waisgate.cgi?WAISdocID=061651451+3+0+0&amp;WAIAction=retrieve">http://frwebgate3.access.gpo.gov/cgi-bin/waisgate.cgi?WAISdocID=061651451+3+0+0&amp;WAIAction=retrieve</a>	As of IFB release date
47CFR Part 90.210	Title 47 Code of Federal Regulations Radio Frequency Devices; Part 90 Private Land Mobile Radio Services <a href="http://frwebgate.access.gpo.gov/cgi-bin/get-cfr.cgi">http://frwebgate.access.gpo.gov/cgi-bin/get-cfr.cgi</a>	As of IFB release date
NMEA 0183 version 2.20 or IEC 1162	Standard for Interfacing Marine Electronic Devices <a href="http://www4.coastalnet.com/nmea/default.html">http://www4.coastalnet.com/nmea/default.html</a>	January 1997
<b>CHART FORMATS</b> S57 (IHO VECTOR) Edition 3.0	International Hydrographic Organization Transfer Standard for Digital Hydrographic Data Special Publication Number S-57	November 1996
BSB File Format - Version 2.0	NOAA/BSB file format specification <a href="http://chartmaker.ncd.noaa.gov/">http://chartmaker.ncd.noaa.gov/</a> <a href="http://media4.hypernet.com/~BSB/bsb.html">http://media4.hypernet.com/~BSB/bsb.html</a>	6 August 1997
MIL-PRF-89049	Format for all NIMA products based on Vector Product Format (VPF)	8 November 1996
MIL-PRF-89023	Digital Nautical Chart (DNC) <a href="http://164.214.2.59/publications/specs/draft/DNC/dnc.html">http://164.214.2.59/publications/specs/draft/DNC/dnc.html</a>	10 May 1997

## 3.0 TECHNICAL REQUIREMENTS

The Contractor shall meet the following transponder requirements:

### 3.1 GENERAL AIS EQUIPMENT REQUIREMENTS

- All equipment, subsystems, and completed configurations of the DSC/AIS shall meet the requirements of Draft Revision of Recommendation ITU-R M.825-1 (Document8/1015-E).

- All external physical components provided shall withstand sustained winds up to 65 knots.
- No Type 1 transponder component, power cable, or information cable or wire shall lie on the vessel deck, interfere with the operation of any vessel, or present any tripping hazard whatsoever.

### **3.1.1 VHF/DSC RADIO COMMUNICATIONS SUBSYSTEM**

The VHF/DSC radio communications subsystem shall:

- Provide a VHF/DSC radio that complies with 47 CFR Part 80.
- Meet all the requirements of Draft Revision of Recommendation ITU-R M.1084-1 (Document 8/1012-E), including 12.5 kHz channel capability.
- Provide a 12.5 kHz emission that complies with 47 CFR Part 90.210.
- Include standard NMEA 0183 version 2.20 and/or IEC 1162 interfaces to printers, electronic charts, navigation devices, radar, and the ship's computer.
- Provide transceivers that are tunable over the VHF marine radio band and capable of operation on simplex and duplex channels.
- Provide minimum receiver sensitivity of 1 uV in the presence of one in-band signal (high side) with a received power of -15 dBm and multiple in-band signals (two or more) with a received power of -27 dBm. These levels are shown in the spectrum recording graphs in Annex A.
- Provide continuous Channel 70 monitoring.
- Provide self identification data that is stored in the DSC unit.

### **3.1.2 GPS/DGPS SUBSYSTEM**

The GPS/DGPS subsystem shall:

- Have a 12 channel GPS receiver with U.S. Coast Guard DGPS capability.
- Include standard NMEA 0183 version 2.20 and/or IEC 1162 interfaces.

### **3.1.3 DISPLAY SUBSYSTEM**

The display subsystem shall:

- Provide open architecture of physical components so upgrades can be made at minimal expense.
- Be capable of displaying electronic chart formats: S57 (IHO vector), VPF (NIMA vector), and plain text display capability.
- Have the capability to zoom in and out and display only the area of interest.
- Include standard NMEA 0183 version 2.20 and/or IEC 1162 interfaces.
- Have the ability to adjust brightness for day and night use.

## **3.2 CHART DATA [CLIN 0004]**

The electronic chart shall display data for all navigable waters of the Mississippi River between twenty miles seaward of the mouth of the river and twenty miles north of Baton Rouge, LA in accordance with CDRL A001. Chart data, when displayed, shall be complaint with North American Datum 1984 paper charts and calibrated to NOAA

standards. Chart data shall be resident in the display unit or on CD-ROM format readable by the display unit.

### **3.3 POWER**

Ship's power (110-240 VAC) may be used as the main power source for the Type 1 transponders. Any physical component operated separately from the ship's power source shall have a self-contained power source which provides for a minimum of 8 hours of non-interrupted use. A back-up battery for at least one hour is required to operate any physical component using ship's power. The Type 2 and 3 transponders shall use 110-240 VAC ship power source.

**3.3.1 Recharging.** The self-contained power source shall be rechargeable using a 110-240 VAC ship's power source.

**3.3.2 Power Adapters.** If external power adapters/inverters are provided to comply with 3.3.1, they shall allow safe operation of all physical components.

### **3.4 RELIABILITY, MAINTAINABILITY, AND AVAILABILITY (RMA)**

The AIS shipboard transponder system shall have an Inherent availability ( $A_i$ ) of at least 99.75%.

The Contractor shall provide transponder RMA predictions in accordance CDRL A002. Predictions shall include reliability, maintainability and inherent availability as defined in Section 4.1, Glossary.

### **3.5 EASE OF USE**

All three subsystems of the Type 1 transponder configuration shall be designed for quick, easy mounting for installation and connecting to a vessel's power. The Type 1 transponders shall be in hard-shelled containers, not weighing more than 20 pounds, and shall be designed to operate in a commercial marine environment.

### **3.6 SUPPORT SERVICES**

#### **3.6.1 TECHNICAL MANUALS, INSTALLATION SHEETS AND OPERATING INSTRUCTIONS**

The Contractor shall provide technical manuals, installation sheets, and operating instructions for each transponder (CDRL A003). Operating Instructions shall be encapsulated in clear plastic for protection from marine elements. The technical manuals and installation sheets shall enable a mariner to use the DSC/AIS transponder.

#### **3.6.2 TRAINING [CLIN 0005]**

The contractor shall provide training for pilots and masters. Each training session shall consist of four hours of training for up to 50 trainees. In accordance with CDRL A004 the Contractor shall submit a training plan that discusses the course topics. The course topics shall include, but are not limited to, a general introduction to the system,

operating instructions, installation instructions, troubleshooting tips, and simple maintenance instructions.

The Contractor shall provide each trainee a set of operating instructions (encapsulated in plastic) and training materials necessary to assist in operating the transponder system (CDRL A005). Training courses shall be conducted in New Orleans at a site to be determined by the Government.

### **3.7 FIRST ARTICLE TESTING AND DELIVERY**

CLIN 0001 units will be tested at a compatible base station located at the Coast Guard Command and Control Center (C2CEN) in Portsmouth, Virginia. The Coast Guard will test CLIN 0001 units in a shipboard environment for compliance with Draft Revisions of Recommendations ITU-R M.825-1 and ITU-R M.1084-1 including 25kHz and 12.5 kHz channel capability. USCG will provide an electronic chart of the test area. The vendor may elect to have an observer present during the testing.

### **4.0 NOTES**

Document 8/1015-E (date 3 July 1997) Draft Revision of Recommendation ITU-R M.825-1 was approved at the ITU Radio Assembly meeting in October 1997. As a result of this approval, the Draft Revision of Recommendation ITU-R M.825-1 has been superseded by ITU-R M.825-2. This document will be released by the ITU in the near future, but is not currently available. These two documents are technically the same, and a transponder meeting either document is technically acceptable.

Document 8/1012-E (date 2 July 1997) Draft Revision of Recommendation ITU-R M.1084-1 was approved at the ITU Radio Assembly meeting in October 1997. As a result of this approval, the Draft Revision of Recommendation ITU-R M.1084-1 has been superseded by ITU-R M.1084-2. This document will be released by the ITU in the near future, but is not currently available. These two documents are technically the same, and a transponder meeting either document is technically acceptable.

### **4.1 GLOSSARY**

Inherent Availability ( $A_I$ ): The probability that a system or equipment when used under stated conditions without consideration for any scheduled or preventative action and in an ideal support environment shall operate in satisfactory condition at a given point in time. It excludes all downtime.  $A_I$  may be expressed as:

$$A_I = \text{MTBF}/(\text{MTBF}+\text{MTTR})$$

where MTBF is mean time between failure and MTTR is mean time to repair.

Mean Time Between Failure (MTBF): A measure of merit of the reliability of a configuration item, defined as the average length of time between failure occurrences. In this context, failures arising from external causes are excluded, and all inherent failures are included.

Mean Time to Repair (MTTR): A measure of merit of the maintainability of a configuration item, defined as the average length of time needed to repair or



replace a failed item. In this context, all forms of wait time are excluded.

## 4.2 ABBREVIATIONS AND ACRONYMS

AIS	Automatic Identification System
DSC	Digital Selective Calling
FCC	Federal Communications Commission
GPS/DGPS	Global Positioning System/Differential GPS
IEC	International Electrotechnical Commission <a href="http://www.iec.ch/">http://www.iec.ch/</a>
IHO	International Hydrographic Organization
ITU	International Telecommunications Union <a href="http://www.itu.ch/">http://www.itu.ch/</a>
LA	Louisiana
NIMA	National Imagery and Mapping Agency <a href="http://www.nima.mil/">http://www.nima.mil/</a>
NMEA	National Marine Electronics Association <a href="http://www4.coastalnet.com/nmea/default.html">http://www4.coastalnet.com/nmea/default.html</a>
NOAA	National Oceanographic & Atmospheric Administration <a href="http://chartmaker.ncd.noaa.gov/">http://chartmaker.ncd.noaa.gov/</a>
RMA	Reliability, Maintainability, and Availability
USCG	United States Coast Guard
VHF	Very High Frequency

## Annex A NEW ORLEANS SPECTRUM PLOTS

The figures shown below are typical spectrum recordings of the electromagnetic environment of the New Orleans, Louisiana port area. Figure 1 shows paging activity below 156 MHz and their corresponding power values. Figure 2 shows the power of NOAA weather broadcast channel WX1 operating at 162.55 MHz.

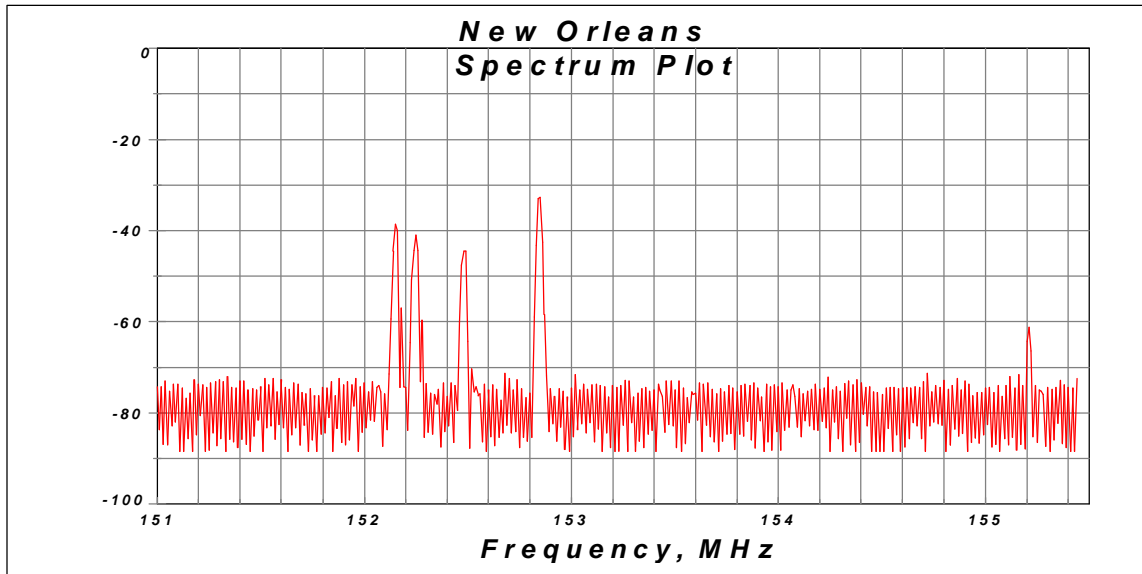


Figure 1

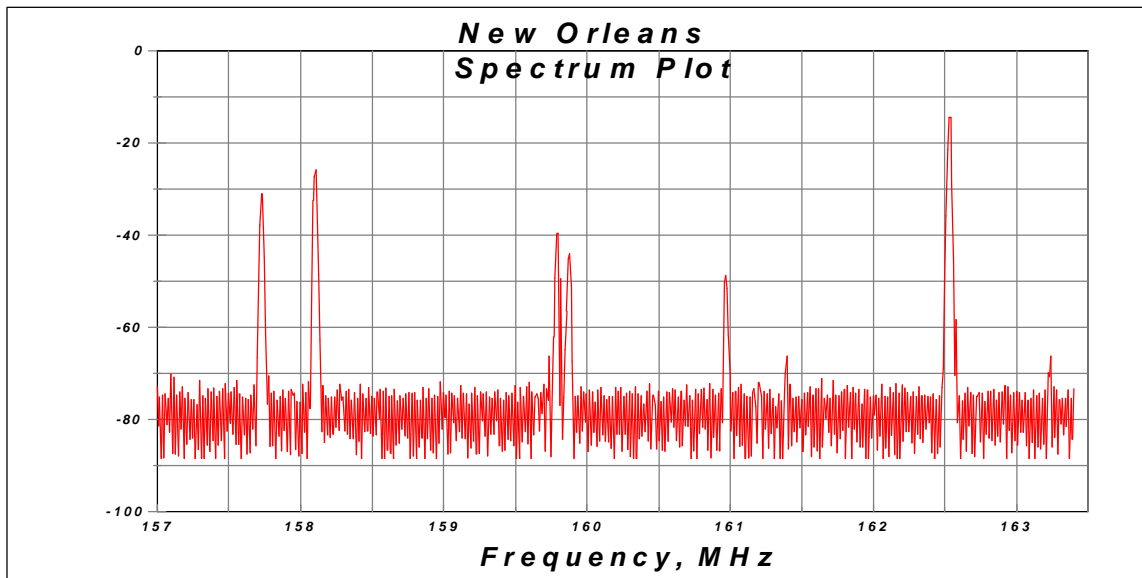


Figure 2

## Annex B

## CONTRACT DATA REQUIREMENTS LIST INDEX

<b><u>Data Item Number</u></b>	<b><u>Title of Data Item</u></b>
A001	Electronic Nautical Chart Data
A002	Reliability, Maintainability, and Availability Predictions
A003	System Documentation
A004	Training Plan
A005	Training Documentation

### ADDRESSEE LIST

#### **DD FORM 1423 BLOCK 14 ENTRY**

#### **COMPLETE ADDRESS**

G-AVT	COMMANDANT (G-AVT) US COAST GUARD 2100 SECOND STREET S.W. WASHINGTON, DC 20593
G-ACS-4	COMMANDANT (G-ACS-4) US COAST GUARD 2100 SECOND STREET S.W. WASHINGTON, DC 20593